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STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES

In Re: Application of Department)
of Public Works of Kent County for)
a license to operate a county owned)
Sanitary Landfill in Plainfield)
Township.)

PROPOSAL FOR DECISION

Dated March 3, 1976

Department of Natural Resources
by William C. Fulkerson
Hearings Examiner

This matter is a hearing on the application of the Kent County Department of Public Works' application for a license to operate a sanitary landfill in Plainfield township, Kent County, Michigan.

PARTIES

1. The applicant is the Kent County Department of Public Works.
2. The Department of Natural Resources, Solid Waste Management Division is the licensing agency.
3. The West Michigan Environmental Action Council and Charles Beale, individually, are the intervenors.

AUTHORITY

1. The license application is pursuant to the Solid Waste Management Act, 1965 P.A. 87, as amended, being MCLA 325.291 et seq.

The administration of the Act was transferred to the Department of Natural Resources as a Type II transfer by Executive Order 1973-2.

2. The Environmental Protection Act, 1970 P.A. 127, MCLA 691.1201 et seq. was properly raised by the intervenors and is applicable to the hearing.

GENERAL FINDINGS OF FACT

1. The county owns 345 acres of land where the proposed site is located. The site is at the corner of Belmont and 10 Mile Road in a rural area. The licensed area is to be 76 acres. The disposal area is to be operated by the cell method. Cells are to be excavated, filled with refuse and covered in sequence. The design calls for 32 cells approximately 28 meters wide, 5 meters deep, and 200 meters long.

2. The proposed site is geologically complex and has been described as an interlobate moraine. As a result of glacial activity, the deposition of materials has not been stratified or uniform. The deposits are complex and heterogenous. The lack of uniform materials renders the site unsuitable for use as a landfill without modification.

3. The site is underlain by two aquifers, one close to the surface and the other considerably deeper. It is undisputed that because of the high water table,

the site is unsuitable as a landfill site in its natural state. Refuse could not be placed without being put into the waters of the upper aquifer. Both aquifers supply domestic water supplies for residences.

4. The design of the county calls for lowering the upper aquifer and by lining the refuse cells to seal the refuse mass. The objective is to contain the refuse mass, prevent infiltration of water into the mass and minimize the escape of liquids from the mass. The primary goal of all landfill designs is to protect ground-water supplies from contamination.

5. I find that the Kent County Department of Public Works is a suitable agency to operate a sanitary landfill.

ISSUE

Is the proposed landfill designed so as to avoid pollution, impairment, or destruction of the ground or surface waters of the State?

GROUND WATER

FINDINGS OF FACT

1. The plan of the county to permanently lower the upper aquifer water level calls for dewatering wells, initially, and then gravity underdrains and interceptor trench to permanently maintain the lowered level.

2. Several witnesses testified that it is difficult to project the piezometric surface to be attained by dewatering. The differences in soil permeability on the site create negative boundaries which influence dewatering. The only reliable method of determining the water level is by observation. It was Mr. Meinert's testimony that the design objective of 2.4-meters isolation from refuse mass to ground water would not occur. This conclusion is based on calculation, observation, and the present design. He testified that in some instances the isolation would be 1.2 meters.

The testimony of several witnesses was that an isolation distance from refuse to ground water of six or seven feet was necessary. I, therefore, find that

the current design provides inadequate separation from the ground-water aquifer.

3. The potential for contamination of the lower aquifer was testified to at length at the hearing. The lower aquifer is of large areal extent and provides drinking water for many individuals. In the event the upper aquifer should become contaminated and a connection between the two aquifers exists, the lower aquifer might also receive pollutants. Dr. Ten Brink, based on his experience in glacial geology, believed it unlikely that the layer of clay underlying the upper aquifer was continuous. Dr. Shah and Mr. Meinert believed any connection to be unlikely. Dr. Shah testified he was 90% sure that no connection exists. None of the soil borings on the site were deep enough to penetrate the lower aquifer. The deeper borings encountered a clay layer underlying the upper aquifer. The maximum depth of clay encountered was 89 feet. It was Dr. Shah's opinion that deep borings to the lower aquifer should not be made. He testified that deep borings might provide an avenue for contamination of the lower aquifer and should be avoided.

The nearest well, in the lower aquifer, to the site showed some artesian head. The artesian condition is an indicator of separation from the upper aquifer. Normally, a well with an artesian head will rise in the well bore to the level of recharge. The level of recharge was below the upper aquifer which indicates no connection. An artesian head is also an indicator of a confining layer above the aquifer.

Based on the well data and soil borings, I find that it is unlikely that the two aquifers are hydrologically connected.

SURFACE WATER

FINDINGS OF FACT

1. Water from the underdrains and runoff from the site will be discharged into a watercourse originating on the landfill site. Water from the dewatering wells is currently being discharged into the watercourse. The design objective is to discharge

clean water only to the surface. The watercourse receiving the discharge is a tributary of the Rogue River.

2. The applicant has applied for a National Pollution Discharge Elimination System permit for discharge of waters from the site.

3. The applicant is required to comply with the Soil Erosion and Sedimentation Act 347 P.A. 1972, MCLA 282.101 et seq. with respect to water runoff leaving the site.

DESIGN AND PLAN OF OPERATION

FINDINGS OF FACT

1. The applicant has designed several engineering modifications of the site to compensate for the unsuitability of the site in its natural state.

2. The modifications include lining of cells to contain liquids, underdrains to lower the ground water and a leachate collection system.

3. The primary concern in a landfill is the control of leachate, water which has encountered the refuse mass. Leachate is characterized as, typically, containing heavy metals and a very high biological oxygen demand. It is a pollutant which must be controlled.

4. The purpose of lining the refuse cells is to prevent the escape of leachate. The design calls for alternative methods of cell lining. The method to be used is dependent upon field investigation by soil borings prior to cell excavation. The ideal situation is where 20 feet of suitable, in-place clay is present and no lining is necessary. It is unlikely that this situation will occur in very many cells because of the heterogenous nature of the materials.

The first lining method is to line the cell with five feet of compacted clay.

The second method is to line the cell with a PVC liner. This may be done by entirely lining the cell or in combination with compacted clay or in-place clay.

5. All cells will be constructed with a slope towards a manhole and sump.

It is the county's plan to pump and draw liquids during the initial stages of the landfill and later install a complete gravity sewer system to a stabilization lagoon.

6. Many witnesses gave testimony concerning their opinions of what types of clay are suitable for containment of leachate. Mr. Scott and Mr. Hadfield testified that they could recognize good clay by observation. If they felt the clay was marginal, they would then use soil testing methods to determine suitability. The design and operation plans do not specify the nature of clay to be used.

There was uniform agreement among witnesses that the type of clay used is a significant factor in the control of leachate. The permeability of clay determines the rate at which leachate will be released from the cells and is a factor in the attenuation of materials from leachate.

The importance of determining a specific criteria for clay is inherent in the protection of ground water. Absent a specific requirement for clay, the proposed design is unacceptable.

7. The goal of the landfill design is to operate an essentially dry landfill. Sealing the top, bottom, and sides of the cells will minimize infiltration of water. Leachate will be produced in some unknown quantity. The top seal of two feet of compacted clay is not impermeable; water will enter the refuse mass. If field conditions are reached, the refuse mass is saturated; as Mr. Handyside testified, a drop of water in will result in a drop out.

8. The landfill design calls for installation of the dewatering trench under cell 31 after filling of cells 1-15. The unpredictable nature of the lowering of the upper aquifer makes the installation of the underdrain prior to depositing refuse necessary. The cell 31 underdrain will have the effect of cutting across negative boundaries and will cause a more predictable lowering of the aquifer. The county has considered the installation of the underdrain an unnecessary disruption of the surface at the beginning of their operations. However, I find the protection of ground water by sufficient isolation distance a more compelling consideration.

9. The intervenors raised questions during the hearing concerning the use of PVC as a cell lining material. The applicant has provided for the placement of 60 centimeters of sand over PVC liners. Mr. Scott testified that PVC has a strength of 2,000 p.s.i. and that the compaction force of their equipment was 30 p.s.i. He considered it highly unlikely that the liner would be punctured during the placement and compaction of refuse.

The placement of PVC liners will require a lesser side slope for cells so lined. Liner anchoring details were not supplied with the application.

The experience with PVC liners for solid waste disposal areas has been limited. The liners are used in sewage treatment lagoons. Mr. Kellow testified that PVC liners were being used in three landfills. He and his staff have reviewed several types of lining materials and feel PVC has the best potential as a lining material. The key in the use of liners is to protect the liner from puncture. It was his opinion that a PVC liner that has not been punctured is a better liner than clay.

10. The design indicates monitoring wells will be installed to monitor ground-water quality. The usual practice is to locate the wells on site after conferring with department representatives. I find that monitoring wells should be installed initially according to the specifications developed by department staff members.

CONCLUSIONS OF LAW

1. The criteria for evaluation of a landfill application are twofold. First, the Solid Waste Management Act, Act 87, P.A. 1965, being MCLA 325.291 et seq. and the promulgated rules. Second, are the substantive standards of the Environmental Protection Act, Act 127 P.A. 1970, being MCLA 691.1201 et seq.

2. The proposed landfill as designed is likely to pollute, impair, or destroy the ground or surface waters of the State. The plans fail to provide adequate isolation from refuse to ground water, specify the nature of clay to be used for lining material, or specify a method for anchoring PVC liners.

The foregoing conclusion leads to the discussion of alternatives to the proposed application which will be explored in the next section of this decision. The procedure followed at the hearing does not lend itself to the traditional approach of establishing a prima facie case followed by rebuttal. The discussion of alternatives was interspersed throughout the testimony.

ALTERNATIVES TO THE PROPOSED APPLICATION

FINDINGS OF FACTS

1. As the testimony at the hearing developed, it became immediately apparent that no one universally-applicable landfill design exists. Each application must be viewed in light of the facts and circumstances presented.

2. I find, as a matter of fact, that feasible, prudent alternatives are available to correct the deficiencies in the landfill design previously detailed.

3. In accord with the testimony of all witnesses, an isolation distance of seven feet between the bottom of refuse cells and ground water is necessary. The immediate installation of all underdrains will bring about a stabilized water level which can be observed by borings in the proposed cell locations. If seven feet of isolation are not present, the cell bottom must be raised to provide the isolation. Engineering modifications in lowering the invert for the underdrains may be necessary if the design level for the bottom of refuse cells is to remain the same.

4. Adopting the testimony of Dr. Shah and Mr. Handyside, I find that suitable clay for cell lining material is clay with particles of .005 millimeters in diameter or smaller and with a permeability of at least ten to minus five centimeters per second. The attenuating and sealing properties of such clay will provide adequate protection for the ground water.

5. Staff members of the Solid Waste Management Division will select the method of soil borings for cells and review the soil samples to determine the suitability of clay. The staff shall then determine if lining of the cell is necessary and review the proposed method of lining with the applicant prior to excavation or fill

6. To ensure proper installation of PVC liners, the applicant shall submit a detailed plan for installation and anchoring of such liners for staff approval. The detailed plans shall specify installation procedures, inspection, placement of sand, and special instruction for placement of refuse to insure lining integrity.

7. The initial installation of underdrains will facilitate the installation of sewer collection lines at the same time. The sewerage lines from sumps can then be connected to the main sewer lines as constructed.

8. The alternatives of no landfill or other potential sites were discussed at the hearing. There is not now available technology to eliminate landfills. There are volume reduction methods accompanied by recycling of useable materials. These methods leave a residue which must be disposed of by landfills. Use of refuse as supplementary fuel for generating plants is in its infancy. Both of these disposal methods require considerable lead time for construction. Although they present a possible alternative for the future, they cannot feasibly be implemented within a reasonable period of time.

Several alternative sites were rejected by the county for various reasons. The requirement of approval by local governmental units appears to be a major stumbling block to the county's freedom of choice. Based upon the evidence presented, I find that the applicant has reviewed alternative sites, and that there is no evidence to support the conclusion that superior alternative sites are both available or feasible.

CONCLUSIONS OF LAW

1. Based on the previous findings of fact, I find, as a matter of law, that feasible prudent alternatives to the design deficiencies of the applicant exist. The implementation of these alternative measures will provide adequate protection for water quality.

2. The application with the alternative actions set forth is acceptable for licensing pursuant to Act 87, and "is consistent with the promotion of the public health safety and welfare in light of the State's paramount concern for the protection

of its natural resources..." Environmental Protection Act.

SUMMARY OF LICENSE REQUIREMENTS

1. A license shall be granted the applicant to operate a sanitary landfill according to the plans and specifications of the applicant with the following requirements as detailed in previous findings.

A. The applicant shall, prior to any excavation or filling of refuse cells:

- i. Construct all underdrains and associated sewer lines,
- ii. Install monitoring wells according to specifications set forth by department staff,
- iii. Provide design detail for installation, anchoring, inspection, and operations for PVC liners which shall be reviewed by department staff, and upon approval become a license stipulation. No PVC liners shall be used until such approval is granted.

B. Prior to excavation, test borings for cells shall be made under department staff supervision as to number location and depth.

C. Department staff shall review proposed lining methods, if any, for individual cells.

D. Suitable clay for use as lining material is clay with particles of .005 millimeters or smaller, and with a permeability of one times ten to the minus five centimeters per second.

E. No refuse shall be deposited in any cell until the water level has stabilized at seven feet or more below the bottom of the cell.

F. In the event disputes should arise regarding any aspect of the design and operation of the landfill, the applicant shall have the burden of demonstrating the propriety of proposed action. The Department of Natural Resources shall retain jurisdiction for final disposition of such disputes.

Department of Natural Resources

by



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